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2nd EDITION.

NOTES AND STATISTICS

OF

CINCHONA BARK,

BY

JOHN HAMILTON,

FELLOW OF THE STATISTICAL SOCIETY OF LONDON.

Price:
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PART I.

INDEX

Page.

Preface 5
The United Kingdom ... ... 6 to 8
The United States of America ... ... 9 & 10
France ... ... 11 & 12
Germany 13
Italy ... ... 14 & 15
Spain 16
Belgium 17
Denmark 18
Russia 19
Sweden and Norway 20
Austria 21

PART II.

History of Cinchona and South American Barks, with some account of Cuprean Bark. ... ... 24 to 33

Countries where Cinchona is grown and cultivated.—

Ceylon ... ... 34 to 41
India, including Darjeeling and Neilgherries ... ... 42 & 43
Burmah 44
Java 45
Jamaica 46
Mexico 47
Bolivia ... ... 48 to 51
General Summary of the Acreage, with present and future productions of cultivated Barks, and approximate requirements of the world, with sources of supply ... ... 52 to 54
Stocks ... ... 55 & 56
Markets ... ... 57 to 59
Von Gorkom on the Invention of Quinine 60
Summary ... ... 61 & 62
Appendix.—Copies of Reviews of 1st Edition of Notes and Statistics of Cinchona ... ... 63 to 68

FINIS.

PREFACE.

In the Second Edition of "Notes and Statistics," I have endeavoured to give more information generally about Cinchona.

In the first part of the Pamphlet I have merely carried on for the year 1882, the rough statistics of the importations of Cinchona Bark into some of the leading European Countries, and the United States, which I published up to the year 1881, in the 1st Edition, with a few particulars respecting population, &c. The barest facts have been unobtainable regarding the importations of Quinine and Bark into Russia, Belgium, Denmark, Austria, and Portugal. The returns given for Spain, Sweden, and Norway, are the only ones I could collect.

In the Second Part, by the aid of Messrs. CLEMENT MARKHAM, and VON GORKOM'S Works, and Messrs. FERGUSON'S Ceylon Directory, and Messrs. T. C. OWEN and T. N. CHRISTIE'S Works on Cinchona, for the use of which I am much indebted to them all, together with letters in the Pharmaceutical Journal, and other sources, coupled with personal knowledge, I have roughly pieced together a short history of Cinchona in its wild state in South America, and Cinchona in its cultivated state in Bolivia, and the East Indies, and notably in Ceylon, with other particulars regarding total acreage under cultivation, and possible Bark requirements of the World, Stocks, Markets, &c.

I have to thank the gentlemen connected with the Consulates of the different Countries treated, those of our own Board of Trade, Messrs. VON GEHE, & Co., of Dresden, Mr. K. W VON GORKOM, of Baars, CAVALIERO SEBASTIANO FENZI, of Florence, Mr. POWLES (late of the United States of Columbia), and Mr. D. MORRIS, F. G S., Director of the Botanical Gardens, Jamaica, who have all so kindly furnished me with trustworthy data, chiefly collected from their Government Returns, which has enabled me to work out these statistics.

JOHN HAMILTON.

12, GREAT TOWER STREET,
LONDON.
November 6th, 1883.

THE UNITED KINGDOM.

In the year 1882, the imports into the United Kingdom amounted to 15,599,920lbs., against 14,040,096lbs. in the previous year. Bark shows in this year a slight fall in the average value, amounting to 1½d. per lb., all round, partly attributable in my opinion to the importation of an excessive quantity of inferior Bark, such as Twigs, Sweepings, and Dust, which, previously, were considered of no particular value. The total value of the imports for 1882, although upwards of one-and-a-half million lbs. more were imported, shows a diminution of £24,281.

In 1882, the quantity reserved for home use, amounted to 6,638,352lbs., being 354,144lbs. less than the previous year. More good Bark, such as renewed crown, &c., certainly found its way on the Market in 1882, than had been the case previously, so that although the total in lbs. reserved for home use shows a slight falling of, we may assume that a better class of Bark (that is to say), one containing a higher per centage of Alkaloids was retained than has hitherto been the case, especially when we find that the value of the exports, although in quantity a quarter more than the imports do not show a proportionate value at all.

In 1882—		lbs.		lbs
Germany ...	received	924,112	against	902,944 in 1881.
Holland ...	„			
(In transit, for the interior of Europe)	„	3,539,760	„	2,910,320 in 1881.
France ...	„	2,270,016	„	1,084,272 in 1881.
Italy ...	„	1,075,872	„	563,136 in 1881.
United States	„	820,848	„	1,455,664 in 1881.
Other Countries including Belgium in 1882.	„	330,960	„	131,264 in 1881.

The imports from the East Indies, more than two-thirds of which certainly come from Ceylon, show an increase on the year 1881 of 2,600,000lbs. which, it must be remembered, is Bark from cultivated Trees. A good deal of this was undoubtedly inferior Twig Bark. as the value shows a considerable fall per lb. The imports of 1881, namely, 1,864,912lbs worth £248,894, equal to 2s. 8d. per lb. average were considerably better in quality than those of 1882, as the 3,263,792lbs were only worth £368,676, equal to 2s. 3d. per lb. average. Chili and Brazil seem to have increased their exports in 1882, whilst other Countries show a slight falling off. The demand for South American was not so constant in 1882 as previously.

Table B.

DATE.	IMPORTATIONS.	VALUED AT.	RATE PER LB.	
	lbs.	£	s.	d.
1870	2,535,568	218,565	1	8½
1871	2,356,816	285,976	2	5
1872	3,186,512	285,620	1	9½
1873	5,121,424	456,056	1	9¼
1874	4,723,264	442,241	1	10¼
1875	4,091,472	374,150	1	9¾
1876	2,914,352	272,154	1	10¼
1877	3,908,800	402,169	2	0½
1878	6,035,232	867,376	2	10¼
1879	6,796,272	970,333	2	11¼
1880	8,917,776	1,183,361	2	7¾
1881	14,040,096	1.814,501	2	7
1882	15,599,920	1,790,220	2	3½

Mean Average for twelve years, ending 1882, 2s. 2¼d.

Peruvian Bark Exported from the United Kingdom.

	lbs.		£
1870	1,431,920	Valued at	123,375
1871	2,017,344	„ „	154,180
1872	2,132,256	„ „	224,043
1873	3,274,320	„ „	341,645
1874	3,899,952	„ „	390,042
1875	3,536,400	„ „	307,137
1876	3,804,080	„ „	391,209
1877	2,583,616	„ „	415,450
1878	4,791,472	„ „	647,777
1879	4,657,296	„ „	649,185
1880	5,415,312	„ „	611,155
1881	7,047,600	„ „	730,050
1882	8,961,568	„ „	903,333

UNITED STATES OF AMERICA.

The total imports of Bark into the United States for the fiscal year, ending June 30th, 1883, show a considerable falling off in quantity, in fact they are less than any year since 1877, To account for this we have merely to look at the importations of Quinine Salts into the United States, since the duty was removed in 1879.

In 1877/78	up to June 30th	17,549	ozs.	were imported.
1878/79	„	228,348	„	„
1879/80	„	716,998	„	„
1880/81	„	708,851	„	„
1881/82	„	794,495	„	„

The value of the Bark imported in 1882 averaged a very much lower price per lb. than that of the previous year. The United States of America derived her supplies for 81/82 from 16 different sources, the United States of Columbia being the most important, whilst England ranked second. The most noticeable feature in the imports of this year is the large supply of Bark received from the British East Indies, amounting to 68 550lbs. valued at £4,409, against 5,096lbs., valued at £1,067 in the previous year (being the first year of the trade direct with the East).

Although the stock of Quinine may be heavy in the United States, it is improbable from these returns that the stocks of Bark are large, and we my infer by the low average value for the year, that any important stocks that are still on hand consist of inferior Cuprean. Speculation in Bark has not been so rife during this year as previously, so we may hope that the Bark Markets will soon steady down and become more regular than has been the case hitherto.

Table D.

Importation of Bark into United States.

Ending June 30th.	lbs.		£	s.	d.		s.	d.
1877	1,976,016	Valued at	112,897	12	0	rate per lb.	1	1½
1878	4,853.006	„	283,539	0	0	„	1	2
1879	6,388,641	„	416,704	0	0	„	1	5½
1880	6,014,625	„	335,622	12	0	„	1	1¼
1881	4,201,372	„	368,875	0	0	„	1	9
1882	3,706,697	„	246,513	0	0	„	1	3¾

Mean Average per lb. for six years 1s. 3d.

ks, Peruvian, Calisay
clusive.

1880.				
Pounds.	£	s.	d.	I
...	...			
2,400	22	0	0	
64,875	8,543	16	0	
258,040	21,491	12	0	
500	3	0	0	
...	...			
18,667	327	0	0	
62,300	4,828	16	0	
4,259	200	4	0	
349,068	51,787	12	0	1
50	1	12	0	
...	...			
3,311	89	0	0	
...	...			
...	...			
11,795	910	0	0	
42,115	669	4	0	
...	...			
4,442	195	0	0	
...	...			
...	...			
...	...			
...	...			
3,800	48	16	0	
...	...			
4,746,379	213,848	8	0	1
442,624	32,656	12	0	
...	...			
...	...			
	335,622	12	0	4

ance.”

1878.	1877.
lbs.	lbs.
2,168,155	883,880
706,391	573,774
379,266	393,811
711,536	227,645
3,965,348	2,079,110

From	Actual Value.				
	881.	1880.	1879.	1878.	1877.
England					
Columbia or New Granada					
Peru					
Other Countries					
Total ...	21,352	£438,369	£390,125	£356,023	£211,110

FRANCE.

The Table E which shows the total imports of Cinchona Bark into France, and also the amount kept in the country for its own use together with the total value, being for the six years ending 1882, is taken from the French Board of Trade Returns. As regards the total imports, large quantities of Bark are received in France, doubtless en route to Countries in the interior of Europe. The total reached in 1882 shows an increase of 7,984,209 lbs. since the year 1877, and nearly 1,300,000 more than in the previous year. Columbia was the country that supplied the largest quantity, whilst England exported a large proportion of her importations to France.

A good deal of the extra 3,000,000 lbs. received from Columbia since 1880 was doubtless composed of the newly discovered Cuprean Bark, which has now flooded the Cinchona Markets for nearly three years. With respect to the Bark used by France herself the increase in 1882 amounts to over three million lbs. compared with the consumption of 1877, as will be seen by reference to Table F the value in spite of the steady increase during those six years is enhanced, and shows a mean average of 2s. 8d. per lb. This must either mean a better demand for quinine, or a superior quality of bark imported.

The total used for consumption has increased by nearly 600,000 lbs., two-thirds of which were apparently supplied by Peru. The four quinine manufactories in France are situated as follows:—two in Paris, one at Angenteuil, and one at Ivry. France has a population of about 37,000,000 and in 1880, the surplus of births over deaths amounted to 61,840.

Table F.

Consumption of Bark in France.

		lbs.		£		s.	d.
1877	...	1,764,600	valued at	211,110	rate per lb.	2	4½
1878	...	2,975,880	,,	356,023	,,	2	4½
1879	...	2,685,467	,,	390,125	,,	2	10¾
1880	...	3,017,557	,,	438,369	,,	2	10¾
1881	...	4,277,145	,,	621,352	,,	2	10¾
1882	...	4,866,081	,,	649,732	,,	2	8

Mean Average per lb. for 6 years 2s. 8d.

GERMANY.

The Table G, giving importations of Bark into Germany with accompanying values, shows not only more than a four-fold increase in quantity of Bark imported since the first year of the six noticed, but a very much higher value per lb. during the last three years compared with the previous three, which conclusively proves a rise in price has in no way checked consumption.

There are five factories for Quinine making in Germany viz., two at Stuttgart, one at Frankfort-on-Maine, one at Oppenheim, and one at Brunswick. Germany has an area of 212,091 square miles. In 1880 the population amounted to 45,234,061 and the surplus of births over deaths was 522,959.

Table G.

STATISTICS of CINCHONA BARK,

Imported and used in Germany.

		lbs.		£		s.	d.
1877	...	1,430,000	valued at	143,000	rate per lb.	2	0
1878	...	1,837,000	„	192,050	„	2	1
1879	...	2,508,000	„	285,000	„	2	3¼
1880	...	3,296,260	„	674,235	„	4	1
1881	...	4,769,160	„	758,730	„	3	2
1882	...	5,674,680	„	851,202	„	3	0

Mean average for 6 years 2s. 11d. per lb

ITALY.

Importations of Bark into Italy.

1876	... ...	990,080 lbs.
1877	... ...	775,040 ,,
1878	... ...	1,422,400 ,,
1879	... ...	1,075,200 ,,
1880	... ...	1,807,680 ,,
1881	... ...	5,546,240 ,,
1882	... ... (roughly)	6,150,000 ,,

It is in this rising and developing country that so much is being done in the manufacture and export of Quinine, and Italy stands out in strong contrast with Spain, where no Quinine manufactories exist, and where the consumption compared with the population is at present infinitesimal. Doubtless owing to Italy containing large tracts of marshy and feverish localities, the attention of thoughtful men has been especially turned to the extension and knowledge of this wonderful febrifuge.

The area of Italy is 114,296 square miles, and the population at the census of 1881 amounted to 28,452,639, and in 1880 the surplus of births over deaths is returned at 87,908. Although it has been possible to obtain rough data in lbs. through analogy of the importations of bark into this country, there is still great room for improvement in this respect, and it would be a service to those of the commercial world in general interested in bark, if the Italian Board of Trade were to tabulate every importation of Bark, naming the country exporting it, with the value of the bark, in the same careful way that is done in other of the leading countries. I find that a total of 55 tons of Quinine were manufactured in Italy in 1882, and taking the average of the bark as containing 2% of Quinine, the importations would therefore have amounted roughly to 6,150,000 lbs., I should almost think the bark imported did not average all round more than 1½% of Quinine, in which case the number of lbs. would considerably exceed those given. As time goes on, and when it becomes more known that an extensive fever-tree growing enterprise is going on in different parts of the globe, as I have endeavoured to show in this work, governments at present scarcely aware of the fact, may be induced to take some pains to compile careful and trustworthy returns of this important article to the benefit of growers, manufacturers, and others.

The large manufactory in Milan produces 50,000 kilograms (about 2⅕ lbs. per kilo.) per annum, and two other smaller manufactories produce some few thousand kilograms, making an approximate total of 55 tons Quinine per annum. Italy imports a good deal of bark direct from Ceylon and India. As much as 1,075,872 lbs. were exported from England to Italy in 1882, being nearly double the exports of the previous year.

The following extract is from the "Times" and shows the urgent necessity for large supplies of febrifuge alkaloid in Italy.

> "Italy is divided into 69 provinces, of which only 6 are
> "completely free from the scourge of Malaria, while it is felt
> "with great severity in 21. It is estimated that 40,000 men, or
> "more than 10% of the army are annually victims, many
> "fatally to malaria, and the annual cost of special hospital
> "arrangement to meet this, amounts to over 10,000,000 francs.
> "The general damage to the whole population from the ravages
> "of this plague must be very great, if we remember that it
> "strikes down hundreds of thousands of working men at the
> "most industrious period of their lives, and that it is the tangible
> "cause why so many districts are allowed to remain barren and
> "uncultivated. It is noteworthy that malaria seems to have
> "increased both in extent and intensity with the developement
> "of railways This is attributed to the large excavations which
> "are allowed to remain unfilled, becoming in time the seats of
> "stagnant pools or marshes. There are some Italian lines
> "which have acquired the reputation of being permanent homes
> "of malarial fever, so that the strongest constitutions cannot
> "resist its continuous attacks. Hence there is great difficulty
> "in securing the supply of personal service necessary to fill the
> "gaps that are being perpetually made by this insidious disease."

SPAIN.

I did not wish a second edition of these statistics to be published, without again trying to obtain some information respecting the importation of Bark or Quinine into Spain.

The following is all I have been able to gather; and this through the courtesy of Messrs. G. J. Huelin, Barcelona.

1.—The importation of Bark into Spain is very small indeed; in fact it has no employment, there being no manufactories of Quinine.

2.—The consumption per annum is about 12,000 bottles of 30 grams, and 3,000 ditto. of 28 grams of good fair Quinine.

3.—Prices range from R40 to 42 = 8/6 about per bottle of 30 grams, 7/6 to 8/- per bottle of 28 grams.

4.—The best marks are Pelletier, Lombard, &c. Duty on Quinine 22/6 per kilogram.

It seems a pity that a grand country like Spain with a population of 16½ millions, should now be so far behind other countries in the use of this valuable medicine, when she through the magnanimity of her famous Countess first introduced what has proved to be one of the blessings of the human race, into Europe.

I find that the progress of population in Spain did not amount to more than 75% in the last 100 years, and only increases at the rate of ¼% per annum. The density of population is considerably less than half that of Italy, and less than ⅓ that of the Netherlands, 46% of the whole surface of the kingdom is still uncultivated. Wherever the nation is most progressive, most enlightened, and best governed, there the records of its commerce are most carefully kept, the most reliable imformation readily obtainable, and the "Medicine of Civilisation" most sought after. There is in Spain an immense field for the extended consumption of Bark and Quinine.

BELGIUM.

As in Austria, as in Spain and as in Denmark, no information is forthcoming respecting direct importation of Bark into Belgium. The British Consul at Antwerp in reply to my letter, very courteously wrote to me as follows:—

"In reply to your recent letter I beg to inform you that, "notwithstanding every enquiry, I am unable to ascertain "particulars of the importations of Peruvian Bark into Belgium. "Wholesale Chemists here inform me, that what very small "quantities they require are imported from the United Kingdom, "and that article is included under the head of "Chemical "Produces" in the yearly report of the Antwerp Chamber of "Commerce."

Belgium has an area of 11,373 square miles. The population in 1880 was returned at 5,519,844, equal to 485 per square mile, being the densest inhabited country in Europe. The population of Belgium has increased very steadily since the establishment of the Kingdom in 1830, when it amounted to barely four millions, since which it has risen at the rate of 1% per annum, ⅕ of the population is engaged in agricultural pursuits, and ⅕ in trade and manufactures. In 1881 the surplus of births over deaths amounted to 58,404. The tendency visible in most European countries, an agglomeration of the people in the larger towns, is also apparent in Belgium, and is particularly showing itself in the capital, which numbered on 31st Dec. 1880, 394.940 inhabitants. The above is taken from the Statesman's year-book.

If we compare the surplus of births over deaths, namely 58,500 to a population of 5½ millions, with Italy for instance, which only gives a surplus of births over deaths of 88,000 to a population of 28½ millions, one cannot help noting that in spite of the crowding of the population, it must be a vigorous and fertile one, and whether they need febrifuge medicine or not, it is much neglected.

A crowded population is usually a poor one, and possibly the expensiveness of bark febrifuge at present, debars many from benefiting by it even when necessary. This is very much the case in England. Doctors often say, if Quinine was only cheaper, they would use double the quantity.

I note from the export returns of the United Kingdom, that Belgium received 281,344 lbs. of Bark in 1882, of which no separate record exists in that country.

DENMARK.

I was not surprised to find that if a large and progressive country like Austria tabulated no statistics of her bark importations, that a small country like Denmark with a population, according to the census of 1880, of 1,969,039 with a surplus of births over deaths of about 24,000, should likewise keep no record of these facts, which would be all important to those engaged in the Cinchona trade, and to others thoughtful of the future well being of the human race. In answer to my queries the Consul in London for Denmark, very kindly sent me the following letter :—

> "After receipt of your letter of the 22nd ultimo., I wrote to "Copenhagen, but I am sorry I cannot give you any definite "answer. It seems there are no factories of Quinine in Denmark, "and if Peruvian Bark is imported at all in the raw article, it is "included under the general appellation of Chemicals in the "Custom's returns, so that no clue can be gained through the "statistics."

The total area of Denmark is 13,784 square miles. Out of an average of 1000 people, 395 live exclusively by agriculture. The increase of population is larger in towns than in the country districts, averaging in the former 10·29%, and in the latter only 5·99% in the course of 15 years. Even amongst this small population one would suppose that febrifuges were more or less required, and as knowledge and intercourse with other countries extend more, attention will probably be directed by medical men to a more general use of Quinine and Bark, and perhaps to the opening of Quinine manufactories in that country.

RUSSIA.

I was unable to obtain any information respecting Bark importations into this Country. H. M. Consul at St. Petersburg kindly made enquiries for me, but found that Drugs of every description imported into Russia are classed under one head. Russia certainly imports large quantities of Quinine, but no records of the actual amount are kept.

The area of the Country is 8,387,816 English square miles, with a Population of 98,297,407 :—12 persons to a square mile.

The Population progresses at an average increase of 781,000 a year. The great majority of the population of Russia are devoted to Agricultural occupations, and dwell in Villages spread thinly over the vast area of the Empire. According to recent enumerations there are but 23 Towns containing more than 50,000 inhabitants.

In this country therefore, an immense field will eventually open out for the use of febrifuges, and it is to be hoped that before long, detailed accounts of the Bark and Quinine importations for each year, may be available for those collecting statistics on these articles.

SWEDEN & NORWAY.

Sweden with its 4½ millions inhabitants, increasing 50,000 per annum, and Norway with its 2,000,000 inhabitants, at present import but insignificant quantities of Bark, which shows that no local factories can exist in these countries. In reply to my letter, the Consul in London kindly ascertained for me that in 1877, some 247lbs. were imported, in 1878, 81lbs., in 1879, 11lbs., and in 1880, 338lbs., and for 1881, 1882 no record was at hand.

It is very evident that although they may receive their supplies of febrifuge in the manufactured article, no demand at present exists for the raw article. There is no reason why eventually a factory should not be opened in either Country, to supply all local needs, in the same way as one has been opened in the Netherlands, a country containing a considerably smaller Population.

AUSTRIA HUNGARY.

In this country at present, all importations of Bark and Quinine are classed under the heading of "Drugs," so that no information regarding them is obtainable.

Out of a total Population of 37,786,206, according to the the Census of 1880, 22,144,244 belong to Austria, and 15,642,002 to Hungary. The increase of Population in Austria Hungary has not been large in recent years, owing to a very high rate of mortality among the Population. In 1880 the surplus of births over deaths in Austria proper, amounted to 156,961, and in Hungary to 68,412. Amongst such a dense Population there must be ample scope for an extended use of Febrifuge Medicine.

It is to be regretted that the Austrian Govenment do not organize special Board of Trade returns, like those of France, England, and America.

PART II.

PART II.

History of Cinchona and South American Barks, with some account of the celebrated Cuprean Bark.

The fact that a good deal in connection with the history of Cinchona, is perhaps vague and unknown to many who may not have had their attention drawn to an important work, entitled "Peruvian Bark," by Mr. CLEMENT MARKHAM, and other literature and information on the same subject, which have appeared from time to time in Colonial and Medical journals, has induced me to write the following short essay in the Second Edition of "Notes and Statistics of Cinchona," I first wish to acknowledge, the very great assistance in carrying out this purpose, I have derived from Mr. MARKHAM's book, and from letters, and extracts published in the Ceylon Observer, and Tropical Agriculturist.

Until quite recently, the very name "Cinchona" was comparatively unheard of, and now, not only is the name, but the knowledge that it is the celebrated Quinine producing Tree, familiar, where one would have expected entire ignorance on the subject. Furthermore, the question is frequently asked,—is it right to spell it Chinchona or Cinchona? The origin of the name, is not so widely known perhaps as it should be. As early as 1638, the Countess of Chinchon, Wife of the Governor of Peru, when apparently dying, from a severe attack of fever, was cured by the administration of the Bark sent down to her at Lima by an Indian. LINNEUS the great Botanist of the 18th century, wishing to honour the Countess's memory, called the Tree "Cinchona," instead of Chinchona, mistaking the spelling; unfortunately he died before he could correct his error. So universal has it become now to spell it without the (h), that probably, in time, the (h) will become entirely obliterated. Lady Ana de Osorio, Daughter of the

Marquis of Astorga, the head of an old Castilion family, was born in 1599 and married, first Don Luis de Velasco, but was left a widow at nineteen. See married then the Count of Chincon, and lived some years with him in Peru. On her return to Spain, she brought with her supplies of Bark, with which she cured many cases of Ague in her native Country; and eventually, the Bark was disseminated through Europe by the Jesuits, hence the names of "Jesuit's Bark," and "Countess' Powder."

The Town of Chinchon, is in the South East corner of the province of Madrid, 24 miles from the town of Madrid. The ruins of the old Castle built by the celebrated Countess' Father-in-law in 1590, are still standing. The present Count of Chinchon, who owns this property, resides in Italy, but is not of that family, which is now extinct.

The Cinchona region of South America, extends from Bolivia, to the Forests of Columbia, a distance of 1,500 miles. The Cinchona Plant has never been found in any part of the world beyond the limits already described. This region should be divided into five sections, each distinguished by the particular variety of Cinchona Tree found therein.—

I. The Loxa region, with its officinalis or crown Barks.

II. The Red Bark, or succirubra region on the Western slopes of Chimborazo in Ecuador.

III. The Columbian region in the United states of Columbia with its soft Columbian or Calisaya de Santa Fé (a variety of C. Lancifolia), its Carthagena (C. Cordifolia), its Pitayo and Cuprean Barks. The last is not of the true Cinchona genus as will be explained hereafter.

IV. The Huanuco region in Northern Peru yielding Grey Barks.

V. The Calisaya or Yellow Bark region in Bolivia and Southern Peru.

Cinchona Bark contains several alkaloids besides Quinine, and each of the above named regions produces its special variety, noted more for one alkaloid than another.

An easier classification would be as follows:—

I. Officinalis (Crown Bark), or "Black" Bark as it is described in Jamaica, rich in Quinine.

II. Succirubra, or "Red" Bark, rich in Cinchonidine.

III. Columbian Barks.—

(*a*) "Soft" Suchas Columbian (C. Lancifolia), and Carthagena (C. Cordifolia), both rich in Quinine.

(*b*) "Hard" Suchas, Pitayo, rich in Quinidine, and Cuprean, although not a true Cinchona, containing Quinine, Quinidine, Cinchonine, and the new alkaloid Cinchonanine in some cases.

IV. Huanuco (C. Nitida, C. Micrantha and C. Peruviana) or "Grey" Bark, rich in cinchonine.

V. Calisaya, or "Yellow" Bark, very rich in Quinine and a little Cinchonine.

C. OFFICINALIS grows in the forests round Loxa, a small Town on the lofty slopes of the Andes near the modern republic of Ecuador, from 6000 to 8000 ft. above the Sea, with a mean temperature between 60° and 65° Fahr. in a moist climate. This Bark was reserved for the use of the Sovereign at Madrid, and his household exclusively; hence the name of "Crown Bark." This species, although it grows to a great height, never attains much thickness. It has small leaves, and the bark is of a rough nature. The usual yield of the large quills is 3·5 %* and its present value in London market ranges from 10d. to 1/10 per lb. Scarcely any has been offered for sale for a long time now. C. Officinalis was for many years the only kind known, and from 1640 to 1776 no other Bark was met with in commerce. It was with this Bark (Varr Bonplandiana) that the Countess of Chinchon was cured.

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* Howard's Nueva quinologia de Pavon.

SUCCIRUBRA (or Red Bark), is found on the Western slopes of Mount Chimborazo, and has been known in the European markets for about a century. Stout tall Trees of this variety have been found at an elevation of 8000 feet, but its natural habitat is lower. It may roughly be described as the large crinkled leaved, straight stemmed, smooth bark species. The alkaloids, chiefly Cinchonidine, range up to 9 %. Its value in London ranges from 5/- to 9/6 per lb. for thick flat bark, and quills from 2/- to 6/6 per lb., according to quality.

SOFT COLUMBIAN (C. Lancifolia or Calisayade Santa Fé) is found in the forests of the Caqueta, on the elevated table lands North of the Tunjo, in the United States of Columbia, at an elevation of 7000 feet to 10,500 feet above the sea. The river Caquetá is a great affluent of the Amazon. It is a tall slender tree growing to a great height in rather swampy land. The bark resembles Beech Bark and does not crack. Its nature is very friable and it loses less in weight than any other bark. Its value is, good to fine, 2/1 to 3/-; ordinary to fair, 8d. to 2/- per lb.

CARTHAGENA (C. Cordifolia) another variety of Soft Columbian, grows on the edge of the Magdalena Valley, Eastward of Popayan. The general height of the tree is from 40 feet to 50 feet, with a diameter of 1½ feet to 2 feet, equal to about twice the thickness of a tree of similar age of the Soft Columbian variety. It is valued at, fair to fine, 1/1 to 2/4, ordinary, 4d. to 1/- per lb.

HARD PITAYO has its habitat in the States of Cauca, bordering on Ecuador, round the village of Sylvia, which is the centre of the Pitayo region, about 8,000 ft. above the Sea. Trees are found up to 9,700 ft. elevation. The Pitayo climate is similar to that of the Loxa Cinchona forests. There are 3 kinds of Pitayo bark, namely, Yellow Bark, Red Pinion Bark, and Pinonamarilla Fina. The present value of Hard Pitayo is from 5d. to 1/10 per lb.

HUANUCO (or Grey Bark) is found in the forests to the North of Lima, on the mountain range of Carpis. The mountain called San Cristoral de Cocheros is the centre of this bark district. The species, C. Micrantha, and C. Peruviana, both grow to a very large size, some being 30 inches in diameter and 70 feet in height. Cinchona Trees are said to require a large quantity of potash for their full development, and as the soil in this district contains it in large quantities, it accounts for the huge size attained by the trees here. The species C. Nitida, is found at a higher elevation, up to about 7,000 ft., whereas the two other kinds are from 4,000 ft. to 5,000 ft. C. Micrantha, yields 2·7 % of Cinchonine (its predominating alkaloid), and is much sought after for the Russian market. C. Nitida, a very lofty tree, yields 2·2 % of Cinchonine, C. Peruviana grows at a lower elevation and yields 3 % of Cinchonine and Cinchonidine. According to HOWARD, Quinine has also been found in samples of Grey bark. The nominal value in the London market for Grey Huanuco, is from 7d. to 1/4 per lb.

CALISAYA (or Yellow Bark), is found in Bolivia and Southern Peru; when the Bark is cut, a yellow gummy matter trickles out, hence the name. There are several varieties of this kind. The ordinary Calisaya Vera, gives 3·8 % of pure Quinine, whilst the valuable species introduced into Java by Mr. LEDGER, and called after him, Ledgeriana, yields as much as 10 % of pure Quinine. A new variety called Calisaya Verde, promises to outvie any previous kind known, as the tree grows rapidly and thickly, and gives an enormous yield of Quinine. The Bolivians, themselves, are cultivating this variety now, and doubtless in a few years, it will make an important addition to the South American Bark trade. The quotations in the London market are—

Calisaya, flat	1/2	2/6.
Quill	4/6	6/0.

CUPREAN BARK. This bark is so named from the dull coppery colour of its external surface, and is obtained not from a true Cinchona tree, but from a neighbouring genus named Remijia. Although a proportion of this bark collected in the neighbourhood of Bucaramanga in Santander has been quietly put on the market for some years, it was not till quite recently that the secret of the existence of a valuable bark containing Quinine was divulged. This led to the discovery of large quantities of these trees on the Columbian Cordilleras, and very soon the market became over-stocked with Cuprean Bark. In spite of this, however, the price of Quinine has not been greatly affected. Had it not been for this counteracting influence, unprecedented rates must have ruled for all the other kinds of bark, and Quinine would have been selling at a fancy price.

The chief points to be noticed in connection with the Cuprean trees, are first and foremost, that they are not true Cinchonas, that their bark contains a large percentage of Quinidine (a rare alkaloid), that there is no trace of Cinchonidine (found largely in nearly all other barks), in the bark, and lastly, that some trees of this variety yield a new alkaloid "Cinchonanime." The bark is extremely dense, and like Pitayo and Calisaya, sinks in the water. The tree is bushy by nature, and the yield of Quinine is from 0 up to 2½ per cent. There are two species of Remijia growing plentifully; one in the Corderilla of the Andes which extends to the great plains of the Orinoco, South of the Bogota, running from a low elevation up to 3,500 feet, called botanically R. Pedunculata; the other in the valley of the Magdalena River in the States of Antioquia and Santander on low lands, called botanically R. Purdieana. Both grow in warmer and drier situations than real Cinchonas.

There are still some doubts about the variety that yields the Cinchonanime alkaloid, but it is supposed to be of the R. Purdieana species, tending slightly towards the Cascarilla genus, which has no alkaloids at all.

A great similarity exists in the trees of the two kinds of Remijia. In both the bark is hard, compact, dense, smooth inside, with a wine red tint, and the fracture is not fibrous. Cinchonime Bark is of a lighter colour, heavier, more compact, and more filled with red resinous colouring matter, with horny fracture.

The following are analyses by M. Arnaud (Cupreas should therefore be divided into four sections).—Firstly, "Old Cupreas," found in the neighbourhood of Bucaramanga, and which have been on the market for some time, but are now getting scarce.

		I. Analysis.	II. Analysis.
Remijia Pedunculata	Quinine	1·60	1·68
	Quinidine	·47	·57
	Cinchonine	·54	·55

Secondly, "Northern Cupreas" recently discovered.

		I. Analysis.	II. Analysis.
Remijia Pedunculata	Quinine	·39	·57
	Quinidine	·36	·45
	Cinchonine	·72	·66

Thirdly, "Southern Cupreas."

		I. Analysis.	II. Analysis.
Remijia Purdieana	Quinine	1·35	·51
	Quinidine	·48	·49
	Cinchonine	·99	·81

Fourthly, "Cinchonanime Cuprea."

This bark is collected near Antioquia, on the other side of the Magdalena River. The Sulphate of Quinine obtained from Cuprean Bark crystallises very well. The fact of finding Quinine in trees of another genus to Cinchona, although important, is rendered less so by the comparative poverty of a good deal of the bark. So little was known of Cuprean Barks until quite recently, that Mr. Clement Markham makes no mention of them at all in his exhaustive work, published in 1880. The particulars herein stated I have mostly gathered from the paper by Monsieur Jose Triana, published in the "Pharmaceutical Journal" re-published in the "Tropical Agriculturist" for July 1882, and from a paper read before the Union Scientifique des Pharmaciens de France (also re-published in the T. A. for November, 1882.

The value of the above bark ranges from 7d. to 2/-. It is conveyed from Bucaramanga to the Port of Ocana, and from thence to Baranquilla. From a pamphlet published on the commerce of New Granada in 1831, it appears that the first regular exportation of the barks of Santa Fé took place in the year 1802, Although previously some remittances were received from the Royal Estate and private hands in Bogotá, which through the ignorance and superstition of the natives, were condemned to the flames The amount exported in 1802 did not reach 200,000lbs. In 1803, double this amount was exported. In 1804, according to the Custom House statistics at Carthagena and Santa Martha (near Sierra Nevada), the exports for Curaccas and Spain reached nearly 1,000,000lbs., while 1½ million lbs. collected during the years 1803 and 1804, were detained on account of the disturbed state of the country. After the war another 500,000lbs. was extracted. In 1831 the trade had almost become obsolete, owing to the depreciation of the quality by mixing good bark with bad, although others attribute it to the falling off of the demand.

Great facilities will soon be available for transporting bark from the new Cuprean districts, as a new line of Railway is being constructed from Cúcuta, to a point on the River Zulia, which flows into the Gulf of Maracaibo, so that bark from the district neighbouring San Hosé de Cúcuta, will find a much readier and cheaper outlet than it has experienced hitherto, having been carried over the mountains to Bucaramanga, and from thence down the River Magdelena to Savanilla or Baranquilla. Besides the above Railway and that of Panama, there are several lines in construction, amongst which is one to connect the rich and fertile valley of the Cuca with "Bucnaventura" on the Pacific coast. The line between Savanilla and Barranquilla has been working for some years.

The Republic of Columbia in 1831 was divided into three separate independent Republics, viz.: "Ecuador," "Venezuela." and "New Granada;" the latter continued under a Central form of government until 1857-58, when the Federal form was adopted and the country was divided into eight States. In 1862, one of the States was divided into two, so that now there are nine States known as the "United States of Columbia." The following is a statement of the population of each State according to the last census taken in 1871, also the Capital towns of each State, with the names of the Rivers or Coast on which they are situated.

STATES.	POPULATION.	CAPITALS.
Antioquia	365,974	Medellin, on the River "Medellin."
Bolivar	241,704	Cartagena, on the Atlantic Coast.
Boyacá	482,874	Tunja, on the River "Tunja."
Cauca	435,077	Popayan, on the River Molino.
Cundinamarça	409,602	Bogotá (on the River San Augustin and San Francisco), Capital of the Republic also.
Magdalena	85,255	Santa Marta, on the Atlantic Coast.
Panama	220,542	Panama, on the Pacific Coast.
Santander	425,427	Socorro, on the River Suarez.
Tolima	230,891	Neiva, on the River Magdalena.
Other National Territories	53,467	
	2,950,813	

The foregoing is a general survey of Cinchona in its native habitat, with a rough generalisation of the particular species found in each region, and which it was necessary to comment on before dealing with the cultivated barks. A fear lest the native supply should fail, owing to the reckless and destructive manner of obtaining the Bark by the Indians, induced European Communities to direct their attention to the introduction of the valuable kinds into localities favourable to their cultivation. In 1854, the Dutch Government introduced several young plants successfully into Java, and that combined with the more recent introduction of a most valuable kind (a Calisaya) by Mr. LEDGER, which has succeeded marvellously, places Java at the head of the enterprise as regards quality of trees in the East. Between 1838 and 1842, the late Sir ROBERT CHRISTISON, backed by Dr. FORBES ROYLE, urged in a memorial addressed to the East India Company, the advantage of trying cultivation in India, but nothing of any consequence was done, until Mr. CLEMENTS R. MARKHAM headed an expedition to South America in 1861, to obtain young trees and convey them to India. The great difficulties he surmounted to carry out his object is fully explained in his own work. He finally succeeded in establishing plants in 3 different parts of India; viz., in Darjeeling or British Sikhim, in the Neilgherries, and in Burmah, at this time plants were also sent by him to the Government Gardens at Hakgalla in Ceylon. Full information will be found as to the progress of Cinchona cultivation in each of these centres, under the heading of the countries mentioned, including the latest particulars of the enterprise in Jamaica, Bolivia; Java, and Mexico, all parts of the world where the Quinine tree is grown and treated artificially, will then have been dealt with.

CEYLON.

In this island so vigorous and determined have been the efforts of the Planters to develope the new enterprise, that the production of Ceylon Cinchona Bark has already affected the old lines of the Bark trade, formerly entirely dependent on supplies from South America. The excellence of the quality, and the unexpected quantity already exported, have much surprised those conversant with the subject; and there are reasonable grounds for expecting, that a great future is in store for growers of this valuable product.

It was not till 1870 that Planters began to turn their attention to other products besides the cultivation Coffee Arabica, for which Ceylon is so justly famous, and although previous to that date many Cinchona trees had been planted, very little thought or attention was paid to extending the supply. From 1870 to 1875 a good number of Officinalis and Succirubra trees were sprinkled about the coffee plantations amongst the coffee trees, and it was found, that where they were kept lopped, they in no way interfered with the growth of the coffee. It is however during the last seven years, especially the last four of the seven, that the great impetus has been given to the growth of this profitable tree, and now there is not a coffee estate in Ceylon, that has not a fair proportion of Cinchona, as well as coffee trees.

In Ceylon the varieties chiefly grown are Officinalis, Succirubra, Hybrid Robusta, (a cross between Officinalis and Succirubra), Ledgeriana, and Calisaya. The two latter seem to require special climates, and do not succeed everywhere; and of all species named, Officinalis is by far the most delicate, and in many localities dies off in the 2nd, 3rd, and 4th year in a most vexatious manner. Succirubra and Hybrid Robusta seem to be the most reliable kinds therefore to cultivate, and they can be grown very profitably over a wide area. The profits from

Officinalis, where successfully grown however, are more important than those from Succirubra, and Hybrids. Ledgeriana is by far the most valuable kind of all, as it yields a percentage of Quinine up to 14·50%, (returns of an analysis of 5½ year old trees from Yarrow Estate), at present there is very little mature Ledgeriana in the country. Calisaya Bark from one on two Estates, (notably Stellenbourg) has proved of considerable value, yet in most cases gives very disappointing results.

The main point to be observed is, that there are no Government plantations in Ceylon as there are in India. The whole enterprise is in private hands, yet it must be remembered that the plants were first established under the able superintendence of Mr. THWAITES, in the Government Gardens at Hakgalla, 5,200 ft. above the Sea, in 1861. From these gardens the Planters were supplied, and by 1877, a total of 5,500,000 plants had been distributed. In that year it was calculated that 5,578 acres were then under Cinchona cultivation. Mr. THWAITES in his report gives 3,000 plants as the total of Cinchonas in all Ceylon in 1862.

In FERGUSON'S Directory, the following is computed as the area placed under cultivation since 1867 to 1880.—

1867	1869	1870	1872
—	—	—	—
50 acres.	100 acres.	200 acres.	500 acres.
1873	1874	1875	1876
—	—	—	—
1,500 acres.	2,000 acres.	3,000 acres.	4,200 acres
1877	1878	1879	1880
—	—	—	—
5,578 acres.	10,000 acres.	20,000 acres.	33·568 acres.

This is up to the date of the publication of the Directory, but even after allowing for trees dying out, and being uprooted, as has been the case in many instances, it would be safe to compute at least another 5,000 acres as having been planted up in each year, in 1881 and 1882, and this would bring the planted area up to, say 43,500 acres. From the careful manner in which the compilers of the Directory have drawn out their Statistics, I consider they may be taken as correct as it is possible to make them under the circumstances, and if, as they estimate the number of trees likely to come to maturity over an area of 33,500 acres, will be 50,000,000, on 43,500 acres the number of mature trees will eventually amount to 65,000,000, and if as is shown from the Exports, over 3,000,000 lbs. (a good deal of this was twig and branch bark it should however be stated) could be harvested over about 15,000 acres (that is taking half the total acreage of 1878 and 1879, as only a proportion of the trees planted in 1879 would have yielded a return by 1882), it stands to reason unless unforeseen diseases spring up, that when 3 times the acreage comes into yield, with the original acreage more prolific, and all the advantages of shaving the trees twice in the year, upwards of 3 times the amount of Bark exported in 1882 namely 3,000,000 lbs., will be exported say by 1887. I should calculate the future yield from Ceylon roughly as follows :—

1883	1884	1885
6,500,000 lbs.	7,000,000 lbs.	7,500,000 lbs.

1886	1887
8,000,000 lbs.	10,000,000 lbs.

which is equal to a yield of 230 lbs. (a very moderate estimate which I have increased 20 lbs. an acre more elsewhere) per acre over 43,500 acres. A large proportion of this Bark will be renewed and consequently of more considerable value.

I cannot do better than quote here Mr. Γ. N. CHRISTIES' table at the end of his prize essay on Cinchona cultivation.

Table of what may be considered fair average yields in quantities of Bark and Sulphate of Quinine.

	Yield in Shavings per Tree.				Yield Shavings per Acre.	
	At 4 Years.	Per-centage of S. Quinine.	At 7 Years.	Per-centage of S. Quinine.	At 4 Years.	At 7 Years.
	Ounces.		Ounces.		lbs.	lbs.
Succumbra	5	1·25	14	2·25	250	560
Officinalis	3	2,25	8	3·50	180	450
Robusta	5½	2·00	14	3.50	250	700
Ledgeriana	5	6·00	12	8.00	250	600

I have purposely estimated the yield per acre very low, as even in four years from now, there will be a great number of young plants from supplies, where the older trees have failed, giving no returns at all on the acreage, and perhaps hundreds of acres which may have died out, having proved themselves unsuitable for Cinchona growing, will be planted up with other products. Mr. CHRISTIE states :—"It must also be remembered "that a dozen years hence, there will be very few of the Cinchonas "which now exist in the country alive, and that unless fresh clearings "are opened, the Ceylon production of Bark having reached the "maximin, say 3 years hence will begin to fall." I can see no reason to concur with him in either statement. If in Ceylon the cultivation was going on entirely in clearings, it is possible then the trees would die out by the acre, but the peculiarity of Ceylon Cinchona cultivation is, that it is on land planted with another product like coffee, that the success is the most marked. I think myself we shall have to look far into the future to fix the year, when the maximum yield of the Island shall have been reached. Although new clearings actually may not be opened, an immense deal of land already opened with coffee, has yet to be planted up with Cinchona as well as tea. I quite agree with him when he states,—"That those now only opening Cinchona estates, have as good a prospect before them as the earlier cultivators had."

A few notes about starting, and cultivating Cinchona may be useful here. and as Mr. CHRISTIES' work is the latest published on the subject, I have availed myself of some of his experience. Carefully selected ripe seed (seed from shaved trees is not considered good) of the variety which it has been decided to plant, should be gathered from mature trees, and placed in beds of finely sifted mould under cover. These beds will require constant attention to ensure success. In about four months, the seedlings will be ready to be pricked out into roughly covered nurseries, and in the course of a few months will be ready for transplanting into the clearing, or amongst the other products already growing.

A difference of opinion exists about the desirability of cutting holes for these plants, but in most cases something of a hole is prepared before the transplanting takes place. Plants are also raised from suckers with considerable success. As regard land suitable for Cinchona. I cannot do better than quote from CHRISTIE's prize Essay.

"In considering the best way to drain, plant, and lop, much " depends on whether we have the Cinchona only to think of, "or whether the Coffee has also to be considered. There " is little doubt that Cinchona is more suited to be a companion to "Coffee or Tea than a separate cultivation, and in most instances, "a good Coffee soil is also a good Cinchona soil. A deep, friable, "and rather gritty or quartzy soil on a fairly steep hill side, is "what Cinchona delights in, and at high elevations Cœteris Paribus, "an Eastern aspect is much to be preferred. I find depth of soil "far more important than richness, but often the two conditions "go together. In new soil the growth of the individual trees is "very much better than in Coffee soil, but the death rate is so "much greater, that I rather think the yield per acre on fairly "good Coffee soil, would equal that of a clearing. For quality of "Bark, I would give the preference to the clearing, for in a series "of analyses taken from trees of different sides of a ravine, I found "that the trees growing on the one side, where the soil was very "good, averaged 1 % alkaloids more than the trees on the other "side where the soil was poor and thin. Cinchona Land, which "is always severely undulating, should be drained, and on exposed "parts the trees should be staked."

The old plan of coppicing the tree to obtain the harvest, has been succeeded in most cases by the new process of shaving the surface bark, which renews again in some four to six months time, giving a renewed Bark of twice the value of the original Bark, owing to the increase of valuable alkaloids. After shaving, it is necessary to place some covering round the tree, such as grass, rags, or paper. This process (hardly yet in vogue for two years), promises success in some localities, and on trees not too young, but some planters think the old process of coppicing will be again reverted to in preference. The great advantage of shaving is, operations can be commenced on trees that would not pay to coppice, so that the Cinchona grower has not to lie out of his money so long as formerly. Uprooting the trees for market purposes has been abandoned, as it is found, Cinchona cannot be grown twice on the same land with any success. From four years old trees, about 80lbs. of wet Bark can be harvested by a cooly, and this dries down to a third. Bark can be harvested in any season, except in the monsoon months, from June to end of August, and is dried in the sun. Mr. CHRISTIE says "opinions "differ as to how much Bark can be shaved from a tree, and "how often the operation can be repeated without injury to the "tree. The Nilgri trees have been barked seven or eight times, "and are reported to be very healthy, but they are twenty years old." He further says, "manuring Cinchonas has hardly been tried to "a sufficient extent to judge of its merits. Trees that are to be "shaved again and again, will require manuring beyond doubt, "and more attention will have to be given to this subject." Some say, shaving hide bound trees, releases the sap. It is quite possible the Cinchona of the future in Ceylon will be nothing but "Hybrids," from cross fertilization.

This short account of operations in Ceylon should convey some idea. not only to the minds of those not actually acquainted with Ceylon, yet still interested in the country for various reasons, but also to the general observer of matters relating to Cinchona, that a great and intelligent impetus has been given to this arboriculture, which bids fair to revolutionize the Bark trade of the world for a time. The following are the exports of Bark from Ceylon for the Commercial season, dating from 1st October to 30th September in each year.

	lbs.
1882—1883 September 30th	6,925,595
1881—1882	3,099,895
1880—1881	1,207,720
1879—1883	1,208,518
1878—1879	373,511

This notice of Ceylon was written about a year ago, since which, several matters in connection with Cinchona have somewhat altered, but not sufficiently to make it necessary for me to re-write the article (Dec. 3rd, 1883.)

	lbs.
1877—1878 September 30th	173,497
1876—1877	56,589
1875—1876	16,084
1874—1875	18,731

Owing to the heavy depression in Ceylon from the failure of the Coffee crops for so many seasons in succession, the opportunities for acquiring investments in Cinchona and Tea property are exceptional, as the country is all opened up, and merely requires capital to carry its new products into bearing, The following is taken from the Report of the Director of the Royal Botanical Gardens, Ceylon, for 1882.

"The enormous advance in the cultivation of Cinchona fully "justifies one in considering it, at present, as the foremost product "of Ceylon. In some of the older districts C. Succirubra on "numerous estates, is now completely supplanting the Coffee, which "is allowed gradually to go out of cultivation, as the former grows "up amongst it. There is little, or no fear of an excess in pro-"duction of Bark of the best qualities here, but it is otherwise with "the poorer sorts, and it is with these from the planting point of "view, production may be overdone. It is pretty evident that we "are approching the time when the almost exclusive estimation of "Quinine must give way before the evident advantages of employing "the mixed alkaloids. Foreign manufactures have already "appreciated the great market opening before them:—thus "the Quinine Manufactory at Frankfort-on-Maine, makes vast "quantities of Sulphate of Cinchonidine for export to the United "States, at a price from $\frac{1}{3}$rd to $\frac{1}{4}$th that of Quinine Sulphate, "and growers should not be unprepared for the change. This, "when it comes, will not be disadvantageous to Ceylon planters with "their large acreage of C. Succirubra, the proportional value of "which to other Barks will rather be increased. How great a "demand for a febrifuge drug exists in the East, may be gathered "from the subjoined extract from a report on the trade of Kana-"gawa, Japan, by Consul ENSLIE .—

" That the consumption of Quinine is not so large as might be
" expected, is due to the fact that the bulk of the population in
" Japan, is too poor to pay for such an expensive drug, and the
" cheaper Cinchona alkaloids are sold in place of it. English
" made Quinine does not appear in this market; that principally
" imported is prepared in Milan. Then comes German, and after
" that Pelletier's Muriate of Cinchonine, which is imported in large
" quantities."

Every month almost brings forward some fresh information about Cinchona cultivation, and at present, variations are so frequent and important, as regards methods of planting, harvesting, &c., together with a most fluctuating market, any errors I may have made in this short account, I trust will be regarded with leniency.

INDIA.

Government plantations are established in three parts of India, and have a total of 3282 acres, situated as follows: Darjeeling 2344 acres, Madras Presidency 888 acres, and Burmah 50 acres. The private plantations in Darjeeling comprise some 1800 acres, and in the Madras Presidency some 5000 or 6000 acres. In both regions private enterprise promises to become extensive. The total number of plants in the Neilgherrie Government Gardens in 1882 amounted to 2,953,287, and the yield of Bark to 242,052 lbs; which should yield a profit of £33 per acre in the year.

The Neilgherrie Bark analysed as follows:—

Renewed Crown	5·57	Quinine.
Mossed	4·06	„
Natural	3·06	„
Renewed Red...	3·04	„
Mossed	1·71	„
Natural	1·28	„

Markham says, in his work published in 1880: "The whole "extent of cultivation on the three plantations, is 848 acres. The "yield of Bark will eventually be 391,666 lbs. a year, valued at "£80,208 per annum. The expenditure is £5000; so the net "annual profit will be considerable." This was written before the importance of Cuprean Bark was known. The Bark grown in the Government Gardens at Darjeeling, is used entirely for the manufacture of febrifuge. At the factory, at Mungpoo, supervised by Gammie, 8010 lbs. of febrifuge were manufactured at a cost of 11d. per lb. This quantity was insufficient to meet the demand, and another 2868 lbs. had to be taken from the reserved stock. The produce of Bark off the plantations for the year amounted to 341,570 lbs. The saving effected by Government in substituting 6196 lbs. of febrifuge, for an equal quantity of Quinine, for use in its hospitals and dispensaries, is very considerable. Taking Quinine at the low average of 8/- per oz. in London, and calculating exchange at 1/8½. per Rupee, it could not have been laid down in India under 74 Rupees per lb., while Cinchona febrifuge cost only 16·8 Rupees per lb.; the saving for the year amounts, therefore, to 3½ lakhs of Rupees. This being added to the 16½ lakhs saved in a similar way in former years, brings the total saved to Government up to 20 lakhs of Rupees, which is exactly twice the amount of capital expended on the plantation since its commencement.

Sales to the public exceeded 1529 lbs., a circumstance which has proved beyond all doubt that the drug is rapidly advancing in the estimation of the public, in spite of its nauseating effects.

Table showing the amount of febrifuge produced from the commencement to 31st March, 1882, and the Stock at the latter date.

	lbs.	oz.		lbs.	oz.
Manufactured in 1874-75	48	10	Supplied to Medical Depot, Calcutta	18,840	3
Ditto „ 1875-76	1,940	6	Supplied to Medical Depot, Bombay	6,200	0
Ditto „ 1876-77	3,750	12	Supplied to Medical Depot, Madras	1,900	0
Ditto „ 1877-78	5,162	0	Supplied to Straits Settlements	30	0
Ditto „ 1878-79	7,007	0	Ditto, Surgeon-General for Bengal (for district medical officers of Bengal)	995	4
Ditto „ 1879-80	9,434	13	Supplied to Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal)	14	12
Ditto „ 1880-81	9,296	0	Sold for Cash	15,073	8
Ditto „ 1881-82	8,010	0	Samples, &c.	95	10
			Stock in hand on 31st March, 1882	1,500	4
Total...	44,649	9	Total ...	44,649	9

These particulars are taken from the Report on the Darjeeling Government Gardens, for 1882.

BURMAH.

Although plants where first introduced into this country in 1865, No great success was attained until 1870, when a new plantation was established some 3700 to 4400 feet above the sea. About 50 acres are now planted in all, the produce from which will be used for febrifuge manufacture for local needs. MARKHAM states "the plants thrive, but it is feared that they may never "attain the size of full grown trees, always remaining stunted "and branched like the surrounding evergreen vegetation."

JAVA.

In this island strenuous efforts have been made to cultivate only the very best variety of Cinchona, namely, Calisaya, Legeriana, which yields a very high percentage of pure Quinine, in some cases over 5 %. The plantations are chiefly on the mountains in the Preanger division of Western Java, from 4400 to 5000 feet above the sea. The first Cinchona Seedling, a Calisaya, ever brought into Java was raised from seed in Paris, and transferred from thence to Leyden. In 1852 it reached Java, but had suffered so much, it could not be kept alive, although one cutting was obtained from it, before it succumbed. Great efforts have been made by the Dutch Government to extend the cultivation of Cinchona in Java, and some 50 estates are now opened entirely with this product, growing the most valuable species, so that by 1884, there will be some 8000 acres or more in cultivation, yielding some 3,000,000lbs. of Bark of fine quality. The following extract from the "Ceylon Observer" of November 11th 1876 is interesting.

"Report on the Government Cinchona Enterprise in the Netherlands India for 2nd quarter, 1876."

Extract. "The chemical analysis has again revealed a num-
"ber of excellent seed bearing Ledgeriana trees, one of which has
"the astoundingly high amount of 13·25 % of Quinine, equal to
"17·83 % of Sulphate of Quinine in the absolutely dry Bark.
"Five years ago Calisaya Bark that contained 3 % of Quinine
"was considered excellent."

"The species which contains Quinidine is still often met with.
"This kind is also of a somewhat high value, since Quinidine is
"the Cinchona alkaloid rarest met with."

The export of Bark from Java to all parts, for the year ending 30th June, 1883, amounted to 420,668lbs.

JAMAICA.

In this island the cultivation of Cinchona promises most favouably. The Government Gardens, amounting to 180 acres were first started in 1861, at some 2500 feet to 3000 feet above the sea. There are about 200 acres opened by private individuals, and another 200 acres were to be placed under cultivation in 1883, giving a total of 580 acres.

The area suitable for Cinchona in Jamacia is very limited, and it is improbable, even under the most favourable circumstances, that more than 5000 acres can actually be planted with Cinchonas of all kinds. The following varieties are grown in the Government Gardens, C. Officinalis, 70 acres; C. Succirubra, 60 acres; C. Hybrid, 28 acres; C. Calisaya, 8 acres; C. Ledgeriana, 10 acres; whilst various kinds such as C. Calisaya Verde, C. Morada, &c., form 4 acres. In 1880, 23,981 lbs. of Bark of the value of £7302, were shipped from the Government Plantations; in 1881, the shipment was 18,400lbs. of the value of £4650, followed in 1882, by a shipment of 21,620 lbs. of the value of £2800, with the exception of a few hundred-weight, shipped by private growers, they represent the beginning of the export trade of Cinchona Bark from the Island of Jamaica.

The Bark crop for the year 1883, from the Government Plantations is intended to be utilized in the island for the manufacture of Cinchona febrifuge, a medicine which Jamaica will probably undertake to supply to the other British possessions in the West Indies at a moderate cost. It is under the guidance of Mr. D. MORRIS (lately attached to the Royal Botanical Gardens of Ceylon), since his appointment as Director of the Botanical Gardens in Jamaica, that such great strides have been made with Cinchona in this island.

In Jamaica, a stiff clayey soil is counteracted by the effect of a peculiar geological formation, to quote T. C. OWEN on Cinchona. The following letter is taken from the "Gardener's Chronicle." "The whole district is composed of White Lime Stone, on which "rests a great deposit of stiff clay. Owing to the remarkably "porous structure of the lime stone, there are no suface rivers or "streams whatever, the surface drainage is conveyed by means of "sink-holes to subterranean rivers. The superabundant moisture "retaining properties of the clay soil, so prejudicial to Cinchona, is "by natural means counteracted."

MEXICO.

A supply of Cinchona seeds was forwarded from India in 1866, by Captain Markham, to this country, which promised to be admirably suited for Cinchona growing, and a site was selected near Cordova for the purpose. A further supply was forwarded in 1871, from the Neilgherries, and the enterprise seemed fairly started. But the sad fate of the Emperor Maximilian, who had taken great interest in the primary movement, seems to have checked the spread of this cultivation. Mexico, possibly, has now some 50 acres under cultivation, which would probably be extended if the price for Bark were maintained.

BOLIVIA.

Growers of Cinchona are naturally anxious to know what is being done in the cultivation of Cinchona in all parts of the world, and, in a compilation of this sort, it is necessary to make as full an investigation of the subject as opportunity will allow, before summarizing conclusions. I cannot do better than quote extracts from "VON GORKOM's Handbook of Cinchona Cultivation," which gives the latest information obtainable. The following is taken from the Report of the Dutch Consul-General at La Paz. HEER SCHUKRAFT for the year 1878 :—

"The great event in the agricultural region of Bolivia, is "the planting of Bolivian Cinchona forests, of which an earnest "beginning was made in 1878, not by official pressure, but by a "genuine initiative of the land owners, and other private persons. "The high prices of the last three years, and the reports of the "Cinchona cultivation in India, have at last awakened here the "spirit of enterprise. The river Mapiri, in the Province of "Larecaja, department La Paz, has been the centre of the movement, and already the young trees of two years growth, may "be reckoned at from four to five hundred thousand. The Songo "and Challana Valleys in the same province, which turn out "equally fine quality of Cinchona, number also some plantations "though of less importance. In the Province of Yungas, the "districts from Coroico and Coripata to the Casones River, are "being energetically planted; and an extensive valley, where "there still exists numerous groups of bushes, stumps, and shoots "from old stems, called the Quinuni Valley, has by purchase "passed into the hands of private persons, who intend to close it "for some years, to allow the young plantations to grow up. "Planting is done in two ways; that which is done on private "estates, and that which takes place on government land. Excepting the Quinuni Valley, and the lands on the Mapiri and "Casones Rivers, all that I have mentioned are private property, "and formerly were divided into haciendas, whose principal produce were Coca, Coffee, Cocoa, Sugar Cane, &c. In the regions "still uncleared on the Mapiri, the undertaking requires greater "labour, and more capital. The land must be acquired of the "State.

"The requisite petition is called a denuncia, and contains a "description of the land declared to be baldio (vacans ager), and "a list of witnesses to testify that it is not private property. "After the witnesses have been examined, there follows a valuation on behalf of the State, and thereafter a sale by public "auction, at which the petitioner enjoys certain preference or "choice above other bidders. One-sided preference always plays "a great part in these grants. If the petitioner is an insignificant "person, without influence or influential friends, his letter of "request is apt to be delayed. On the contrary, some lands are "valued at low assessments, and, as in the case of the Quinuni "Valley, as good as given away. This valley, probably 10 "German miles (if these are German geographical miles, that "would be equal to a little over 46 English statute miles in length), "in extent, was given over to a private planter for the sum of "£100, and a still larger estate on the Mapini River for £250.

"On the Mapiri plantation there are already some plants "which were put out earlier than 1878, and the proprietors affirm "that from these and 2-year old plants, they have already obtained 300 quintals of quilled Cinchona, say 13.800 kilos, and "thus received back a part of their capital. In the first and "second years the plant is exposed to two dangers,—namely, "drought, and destruction by ants; after that time, there is no "further danger from these. The drought which prevailed in "1879 throughout Bolivia (in India and Europe on the contrary, "there was great complaint of the unusually wet weather), killed "thousands of plants in Mapiri.

"Whether the planting in Bolivia (to which the planters in "Java cannot be indifferent), will be earnestly prosecuted, depends "on the market prices of the ensuing 3 or 4 years.

"A Bark yielding less than 2% Quinine, as export produce "from Bolivia, is for trade as good as worthless (owing to cost of "transport), and plantations of similar trees are good for nothing. "Thus success is, by no means sure, and in every case the "chances are every bit as much in favour of the Javan, as of the "Bolivian planter. If, however, this part of Bolivia were annexed "to Chili, then from the stringent regulations of that country, an "entirely different result might be expected, which would have "serious effects upon the Cinchona cultivation in Java.

"The total export of fine factory Cinchona Bark in 1879, "from the Port of Mollendo, merely amounted to between 300,000 "and 350,000 kilos, half of which was derived from the Province "called Canpolican, the extreme north of Bolivia, which tends to "show that there the extirpation of the trees has not yet reached "its climax as it has in the Yungas.

"The Southern Province of Santa Cruz and Cochabamba "yield an ample supply of false Cinchona Bark, possessing no "Quinine, and worthless for the manufacturer, but it serves for "the fabrication of another very useful product in Europe, the "so-called Quinine wine."

MR. VON GORKOM adds "From a recently received private "report, it appears that shortly afterwards, the Bolivian Govern-"ment promulgated a new and amended law as to obtaining "State lands, by which the holders are assured of better gua-"rantees. The great difficulty of export from Bolivia, is that pro-"duce, as a rule, must find its way through foreign territory "(Peru) to reach the principal, and oft mentioned port of Mollendo. "But as the South American Barks must be destined for the pre-"paration of Quinine wine, then it will not be doubted that on "account of the expense, it cannot remain in competition with the "Succirubra Barks raised in the British and Dutch Indies, which "are eminently suited for that purpose. This species can hardly "thrive quicker and more robustly even in South America, than "it does in suitable estates in the Indian possessions of both "nations, where it can return a rich paying harvest in from 4 to "6 years, provided the prices of the last years do not fall too "much. Cultivation has also been attempted at the present time "in the republics of Ecuador, Venezuela, and New Granada, it "seems, even so far as importing rich species, by using seed "collected in Bolivia."

From the foregoing extracts it would seem, that although it is evident a good deal is being done in Bolivia in the cultivation of Cinchona, it requires two special factors to make the enterprise appreciable on the markets of the world, neither of which just at present can be taken into account, namely, annexation of Bolivia by Chili, and high prices of Bark to stimulate the opening of fresh land.

It appears that a 2 % Bark cannot pretend to come into competition with a 2 % Bark raised in the East, owing to the expense and difficulties of transport, more or less hampered by the necessity of passing through a foreign country (Peru). Again the class of cultivators, who would naturally pay special attention to growing Cinchona, if high prices were ruling, prefer the more lucrative cultivation of Coca, which can be sold on the spot, and so save themselves high transport charges. We hear rumous of large tracts being opened with the valuable Calisaya Verde, but of this HERR SCHUKRAFT makes no mention in his report. There is apparently an unsystematic cultivation, not all of valuable kinds, although doubtless a large proportion of the trees planted is of a good variety.

The acquisition of land does not seem obtainable, so much by open competition as by private negociation, which is always a hindrance to a new enterprise. Although drought and destruction by Ants, is mentioned as having effected much damage, these are difficulties that can be overcome by re-planting. Insecurity of private property, questionable origin of the new possessions, and doubtful right of the proprietors, coupled with scarcity of labour (for I note the uncleared regions require greater labour and more capital), make me think that it will yet be some years, before the cultivated Barks of Bolivia assume much importance in the Bark markets of the world. The scare about the extent of acreage being planted in Jamaica for instance, had no foundation, as will be seen by reference to the notes on that island, and so with Bolivia, I cannot help thinking that, she will not export even 2,000,000lbs. of cultivated Bark in any year of the next six.

BARK REQUIREMENTS OF THE WORLD, ROUGHLY IN 1882.

The following can only be an approximate calculation of the Bark Requirements of the World, portions of which are, doubtless, still held in stock, which varies from time to time (see Stock Account for the United Kingdom).

We find, out of their imports, these countries retained presumably for their own use, and to manufacture into Quinine, as follows:—

	lbs.	
England	6,638,352	
France	4,866,081	
Germany	5,674,680	
United States	3,706,697	June, 1882.
Italy	6,150,000	
India	500,000	for febrifuge.
Holland	350,000	
Other Countries, say	1,000,000	
	28,885,810	

It is interesting to guess even how many pounds out of these 29,000,000 lbs. were collected from cultivated Cinchonas.

	lbs.	
In 1882, the yield of Ceylon and India amounted to roughly	5,000,000	
Java	350,000	
Bolivia	200,000	(a guess).
Jamaica	22,000	
Mexico	5,000	
	5,577,000	
Wild Bark from South America and the United States of Columbia, chiefly Cuprean	23,308,810	
	28,885,810	

	lbs.	
In 1883, the yield from Ceylon and India may be roughly put at	9,000,000	
Java	450,000	
Bolivia...	350,000	(say)
Jamaica and Mexico...	30,000	
Total...	9,830,000	

It is impossible to know what quantity of Quinine is held in stock, and what quantities of Bark are likely to be required each year, but it is very evident that, there is a most hopeful future for good cultivated Barks for a long time to come.

Should the demand for Bark extend, say at the rate of 15 % per annum, which is a very low estimate, looking at figures already quoted, in six years time from, 1882 to 1888, the requirements of the world would be say 33,300,000lbs., The question then is, will the cultivated Barks of the world be sufficient for the trade without using wild Bark at all?

Possibly the acreage of the cultivated Barks of the world in 1888 will be yielding somewhat as follows:—

		lbs.		lbs.
Ceylon	43,000 acres	@ 250	an acre ...	10,750.000
India (for export)	12 000 acres	@ 250	„ ...	3,000,000
Java	8000 „	300	„ ...	2,400,000
Bolivia	2000 „	400	„ ...	800,000
Jamaica and Mexico	1200 „	250	„ ...	300,000
				17,250,000
Balance of Bark required wild Bark)				16,050,000
				33,300,000

It must, however, be remembered that all the cultivated Bark harvested by 1888, will show a much higher percentage of alkaloids, than is the case at present, so that it does not follow that so much wild Bark would be required as one would suppose at the first glance at these figures, even if approximately accurate.

The accompanying Table, showing Receipts, Stocks, and Deliveries of Cinchona Bark for the United Kingdom, during the First nine months of 1883, cannot fail to be interesting and instructive to those anxious for information on the subject.

If we examine the position of the East Indian (mostly Ceylon), Bark trade we find, that in January, April, and August, the receipts exceed the deliveries, whilst in the other six months the reverse was the case. Had not the Stocks at the commencement of the year been abnormally large, the position for the nine months would have been exceptionally good, as regards East Indian Bark. The total deliveries for the nine months amounted to 8373, Bales and Cases, against 3243 Bales &c., the corresponding nine months of the previous year, and against 1339 Bales, &c., in 1879. The stocks of East Indian Bark at the end of September in 1883, amounted to 4713 Bales, &c., against 2712 Bales, &c., at the corresponding period of 1882, and against 440 Bales, &c., in 1879. Hence it will be seen, although the stocks are comparatively large, they are not alogether excessive considering the favour in which East Indian cultivated Bark stands. Again, the total imports for the nine months amounted to 9582 Bales, &c., against 5032 in the corresponding nine months of 1882, being nearly double; whilst the total deliveries for the nine months, viz. 8373 Bales, &c., were considerably more than double those in the previous year, viz 3243 Bales, &c.

Now, as regards the position of South American Bark, we find in one month only, namely June, did the deliveries exceed the imports; so that with the large stock of 69,758 serons, &c., to start with at the beginning of the year, the imports exceeding the deliveries, have gradually added to it, until we find by the end of September 1883, the stock of South American Bark has reached the unprecedented total of 94,461 serons, &c., against the total of 53,995 serons, &c., at the corresponding period of 1882, and against 17,581 serons, &c., in 1879. A great deal of the present stock of South American Bark, it should be added, is of inferior quality, containing about 1 % of Quinine only. During the first seven months, the deliveries varied from 5 to 10 times those of East Indian Bark, whilst in August and September, they amounted to little more than 2 to 3 times those of East Indian Bark, which shows a stagnant and unwieldy market at this period, in keeping with the great fall in the value of all Bark.

The total deliveries for the nine months amounted to 44,330 serons, &c., against 71,036 serons, &c., delivered in 1882, and 70,084 serons, &c., delivered in 1881, and 36,265 serons, &c., delivered in 1879, so that whilst the deliveries of South American Bark decreased in 1882 by 26,706 serons, &c., those of East Indian increased by 5130 Bales, &c. This fact shows that, cultivated Barks are becoming more and more sought after.

of Month.		Deliveries for Home use and Export.				
880.	1879.	1883.	1882.	1881.	1880.	1879.
449	87	726	161	165	370	224
5,718	5,946	3,625	6,353	5,151	6,479	3,415
563	219	1,835	277	455	803	355
,365	10,665	7,996	9,098	16,764	11,201	6,904
974	372	2,751	340	706	1,095	480
,767	16,895	14,687	14,458	23,687	15,720	12,325
,543	544	3,419	704	1,108	1,463	712
,118	20,464	21,321	20,336	29,037	21,598	17,179
,775	627	4,214	1,065	1,355	1,720	936
,412	25,479	25,591	27,781	37,546	26,020	20,535
,926	680	5,136	1,465	1,686	2,016	992
,498	29,113	34,746	33,125	44,891	3,1635	23,540
,759	810	6,171	1,819	1,977	2,434	1,045
,627	34,777	38,724	39,121	54,691	38,289	28,693
,336	1,010	7,341	2,473	2,334	3,292	1,127
,998	39,953	41,365	57,759	65,842	44,071	30,991
,020	1,176	8,373	3,243	2,508	3,726	1,339
462	45,512	44,330	71,036	70,084	48,824	36,265

MARKETS AND MANUFACTORIES.

In London Bark is sold by public auction every alternate Tuesday, at one o'clock, at Messrs. Lewis and Peat's offices, No. 6, Mincing Lane. Samples are on show a day or two before the sales, at the sale-rooms of the different brokers. Samples of each parcel of Bark are sent round to the different buyers, some ten days previous to the sale for the purpose of testing its value by analysis.

The buyers of Bark (there are about ten or twelve only in the London market) are divided into two sections, viz.: those who buy for the druggists, and those who buy for the manufacturers of Quinine, the last named being by far the most important. The "druggists" buy entirely on appearance, hence a fictitious price is often obtained for a good looking Bark, which would show a poor analysis. They dispose of the Bark in small lots amongst the chemists on the Continent, who use it for tinctures, tonics, &c. The "manufacturers" buy entirely on analysis at so much the unit of Quinine (which varies from time to time) on orders from Europe and America, to supply the manufacturers established there for making Quinine, and it is on these orders, whether few or many, depends the dulness or briskness of any particular sale. The market in Paris takes the next place in importance, now that the New York market has lost its significance, since the abolition of the duties on Quinine. It is said that the East Indian Barks are still difficult to work in France on account of their hardness, and the amount of secondary alkaloids, and large percentage of resin.

At the present time there seem to be sixteen known manufacturies of Quinine in the world.

In London	2	Howard & Whiffen's
Philadelphia	2	
Milan	1	
Genoa	1	
Germany	5	
Paris	4	
Amsterdam	1	
	16	

Von Gorkom says, "The cost of a factory appears to be from "£25,000 to £41,667. The two large factories at Philadelphia "are said to turn out more produce than all the European "factories together, but they do not seem able to continue competing with the great European firms, and America requisitions "more and more quinine salts from Europe each year, and "gradually the New York market will be compelled to confine "itself to Pharmaceutical Barks. That the number remains so "limited must be owing to the special knowledge required for the "extraction of the raw material. This knowledge is, doubtless, "confined to a few people, and it remains a secret which each "establishment keeps to itself."

A great depreciation in the value of all Bark has taken place since the autumn of last year, which has greatly disappointed holders and growers. Had the price of Quinine fallen as well, the injury to growers would not have been so serious.

A large surplus stock of Quinine was manufactured some two or three years ago, when Cuprean Bark was first imported; and it is probable the present fall may be attributable to this stock remaining on hand in some cases; and so checking the demand for fresh supplies of Quinine. Cuprean Bark, which has so mightily affected the Bark trade of the world, is not mentioned even either in Markham's nor Von Gorkom's works: this shows how easily an important factor may spring up in any trade and nullify to some extent previous calculations.

In spite of the steady increase of the consumption of Quinine, some 10% per annum, the stocks have increased largely, and it will be some time before they are worked down, unless some event of importance should take place, such as a Continental war. The present low prices (unit from 5d. to 6d. only) have quite stopped the sale of South American Bark in the London market, and it is very evident that Bark collected from wild Cinchonas is unable to compete on account of expense in collecting, and inferiority, with cultivated Barks from Ceylon, and other parts of the East.

These Three Tables will show the variation in price since 1880 of East Indian Bark.

	February 14th, 1880.	October,—1882.	October 5th, 1883.
CROWN.			
Twigs	1/9	5d. — 1/8	1d. — 3d.
Chips	2/6	1/3 — 4/9	6d. — 1/6
Root	4/-	2/3 — 5/6	8d. — 1/6
Spoke Shavings	(unknown then.)	2/- — 4/-	6d. — 1/6
Quill, 2nd quality	4/8	2/6 — 3/6	10d. — 1/6
„ 1st „	6/1 — 7/2	3/6 — 5/-	2/- — 3/-
Renewed	8/6 — 10/-	3/4 — 6/-	1/- — 4/6
RED.			
Twigs	6d. — 1/1	3d. — 1/-	1d. — 3d.
Chips	1/4 — 1/6	1/- — 2/8	3d. — 10d
Root	2/2 — 2/4	1/3 — 2/4	3d. — 8d.
Spoke Shavings	(unknown then)	1/8 — 3/9	5d. — 1/6
Quill, 2nd quality	1/8 — 1/10	1/5 — 2/2	6d. — 1/-
„ 1st „	2/9	2/6 — 3/9	1/9 — 2/4
Renewed	4/-	2/6 — 4/9	1/- — 2/4

ARTIFICIAL PREPARATION OF QUININE.

The frequent rumours that nature was on the verge of rendering up her secrets to the Scientist and Chemist, and that quinine would be obtained Synthetically before long, has occasionally given needless alarm to those interested in Cinchona cultivation. Von Gorkom in his exhaustive chapter on this subject writes as follows: "Granted now, that at no very distant period it may be "possible to prepare the most valuable Cinchona alkaloid by the "synthetic method, what dangers have the Cinchona planters to "fear from this scientific triumph? In our opinion the natural "product would not be thrust aside, though the competition might "become serious. It is by no means certain that with a similar "chemical composition, similar physiological and therapeutical "effects would follow, and even where it so, then people would for "years cling to the old well ascertained state of things, before an "unconditional trust would be placed in the new venture. In any "case, the artificially obtained Quinine would require costly production, and experience must show, by which way this remedy "can be most advantageously prepared. What does the history of "Madder teach us? Its culture seemed doomed to entire "extinction, when the way to prepare that colouring matter artificially was found out. Yet it is not only still existent, but it is "even considered at the present day, that an extension of Madder "cultivation is desirable and profitable. The product of art does "not seem to satisfy the Dyers in every point, as well as the "material which nature offers. Indigo also has now been prepared "artificially; this fine discovery, however, will be first valuable to "industry, only as soon as the indispensable raw material can be "procured in sufficient quantity and in a profitable manner. Indigo "culture goes on its way, and is not as yet dangerously menaced.

"The possibility of an artificial preparation of Quinine may "rise up before the planters as a threatening spectre, but we "continue convinced, that the cultivation of Cinchona thereby "would in no way receive a death blow, that at most it would "have to be narrowed or modified, and yet remain profitable."

SUMMARY.

As will be seen by the Tables referring to the countries, whence information has been obtainable, every consecutive year shows a great increase of importations of Bark. As regards the United States of America this is not the case, but the manufactured article, since the duty on Quinine was removed in 1879, has been imported in enormously increasing quantities. It is very evident that more and more febrifuge medicine will be required each year throughout the world; and I have shown by statistical reference that in countries, where at present no records of Bark or Quinine importations exist, and where presumably they are little understood, there is an immense field for a further extension of the trade.

The enormous exports of the famous Cuprean Bark, and in consequence the manufacture of a surplus quantity of Quinine some two years ago, have most distinctly temporarily upset the Bark markets, for all kinds of South America and East Indian Bark. Prices have now reached a lower point than it is possible to collect it at, in its wild state, and cultivators who have been lying out of their money for some years, will scarcely harvest their Bark unless obliged to, during the present unsatisfactory state of the market, 5d. or 6d. a lb. all round nett on a parcel, scarcely paying harvesting and other expenses. A glance at the price list of the various Barks, shows how abnormally low they are at present.

In enumerating the different countries where Bark is cultivated, it will be seen that Ceylon is by far the most important; but it is said Bolivia, Java, and Southern India are making great efforts in the same direction. I have endeavoured to calculate as nearly as inference will let me, what we can expect the imports to be from those Countries by 1888, and what the Bark requirements of the world may possibly come to then. Some cultivators are alarmed at the heavy stocks remaining in the United Kingdom at this date, but when we examine carefully the position of East Indian Bark, we see the deliveries have been on the whole very fair, although the prices have receded considerably. A large proportion of the Bark held in stock in London is inferior 1 % Cuprean.

The extract from Von Gorkom's work on the invention of Quinine will be interesting to many who dread an artificial creation of the article, and the following statement from his work will relieve the minds of others, who fear an over supply glutting the markets. "It is beyond doubt, that even in civilized and "regularly governed countries, every year thousands suffer from "fever, which is not combated in time by the administration of "the necessary, but expensive means of health; further, that "entire countries still remain insensible to the excellent remedy; "so we may picture to ourselves, that the consumption at the present "day of Cinchona and its alkaloids merely represents a *paltry* "*fraction* of the quantity which will be required to satisfy the "prescriptions of medicine and humanity, in every country, and "among all classes of men. In fact the want may be termed "limitless."

In conclusion I may add that, in my opinion, cultivators of Bark have a good prospect before them, in that they can compete more than favourably with the great Wild Bark trade of South America, and that as far as one can judge now, even in five years' time the cultivated Barks, unless a tremendous impetus was given to increasing the acreage, will do little more than supply half the requirements of the world.

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APPENDIX.

Reviews on 1st Edition of "Notes and Statistics of Cinchona."

CINCHONA BARK.—*Liverpool Paper.*

A most valuable *Brochure* has just been given to the commercial world by Mr. John Hamilton, of London, in which attention is drawn to the great, we might almost say marvellous, increase in the production of and dealings in Cinchona bark. Everybody knows the value of quinine as a medicine, but very few people could estimate the weight in pounds or value in sterling of the drug consumed all over the world. In the United Kingdom alone the imports from all quarters, we learn from Mr. Hamilton's paper rose from 2,535,568 lbs., valued at £218,565, in 1870, to 14,040,096 lbs., value £1,814,501, in 1881. Further, to give an idea of the magnitude of the operations in this article, we may point out that, whilst the imports were as stated above, more than half the quantity was exported, but the value being only £730,050, it is evident the commoner quality went away and the better was kept here, as the balance of the value of imports was no less than £1,084,451. There would appear to be extensive speculative operations in the article in the United States and elsewhere. Out of total imports of 4.201,372 lbs., valued at £368,875, she took 1,455,664 lbs. from the United Kingdom last year, and exported to us 489,664 lbs. France sent us 1,067,808 lbs., and took from us 1,084,272 lbs. In our own East India possessions, notably Ceylon, the growth and production has been very rapid, and is to be still further developed. In 1876 we imported from our own East Indian possessions 158,480 lbs., in 1881 1,864,912 lbs., being a tenfold increase in six years. The United Kingdom derived its supplies from nine principal countries, America from twenty eight different parts of the world. It would occupy too much space to give full particulars of the imports and exports in all European countries. We may remark, however, still quoting from Mr. Hamilton's tables, &c., that France took last year 4.277,145 lbs., against 1,764,600 lbs. in 1877. Italy imported 5,546,200 lbs. in 1881, against 990,080 lbs. in 1876. Germany in 1881 imported 4.769,160 lbs., against 1,430,000 in 1877.

One very strange feature is the fact that, notwithstanding the great increase in production, prices have in no case fallen below values in 1870, but on the contrary are higher than ever. In 1870 the price here was 1s. 8½d., and in 1881 2s. 7d. per lb., the average of twelve years being 2s. 2½d. The conclusions naturally arrived at are that, no matter what the supply may be, the demand is able to absorb it, and that the production must be profitable seeing that prices still show a hardening tendency after an advance of 6d. to 1s. per lb., and that in the face of a production five to ten times in excess of the visible supply ten years ago.

CINCHONA BARK.—*Public Ledger, Oct. 30th,* 1882.

NOTES AND STATISTICS OF CINCHONA BARK BY JOHN HAMILTON.*

The above is the title of a very useful and interesting pamphlet on an article of growing importance, not only in a commercial but also in a medical point of view. Everyone who admits the valuable properties of "Quinine" will be ready to encourage the production of Cinchona Bark. Originally the States of Columbia and adjacent districts of South America almost had a monopoly of this valuable product, and they still continue (although at heavy cost) to supply the largest proportion; but attention has of recent years been attracted to its cultivation in Ceylon and other parts of India. The efforts in this direction are now assuming somewhat formidable proportions, and promise to attain a magnitude which may ultimately materially affect the production in South America.

Mr. Hamilton, who seems to be well acquainted with the article, appears to have devoted great time and attention in collecting the information he furnishes, judging from the valuable data contained in his pamphlet, which embraces notes and statistics of nearly all European countries, as well as of the United States of America.

In the United Kingdom alone the total imports of Cinchona Bark have increased from 2,535,568 lbs., in 1870 to 14,040,096 lbs. in 1881. Of this latter quantity last year 1,864,912 lbs. were from the British East Indies, whence only 158,480 lbs. were received in 1876. France imported 7,950,506 lbs. in 1881, against 2,079,110 lbs. in 1877, retaining of the former quantity last year 4,277,145 lbs. for its home consumption, against 1,764,600 lbs. in 1877. Similar results are evidenced in Germany, where the quantity imported and used rose from 1,430,000 lbs. in 1877 to 4,769,160 lbs. in 1881.

Italy shows even a larger increase, the imports being 5,546,240 lbs. in 1881, from 990,080 lbs. in 1876, and 775,040 lbs. in 1877.

These are a few of the striking features in connection with the movements of the article in Europe. The Cinchona Bark trade in the United States of America also illustrates some interesting and important items. The total imports into that country in 1877 were 1,276,000 lbs. rising in 1878 to 4,853,000 lbs., in 1879 to 6,388,641 lbs., in 1880 to 6,014,625 lbs., but in 1881 there was a falling off in quantity to 4,201,372 lbs., but the value of this last named quantity exceeded that of 1880 by about £33,000, which would seem to arise from the quality in 1881 being superior, and comprising much larger importations from England, yielding a larger percentage of alkaloids.

These details are but a summary of some of the copious information contained in the pamphlet alluded to, and which we can commend to the notice of all who take an interest in this largely increasing and important production.

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* London, 1882, J. W. Collings, Botolph Lane, Eastcheap.

From Pharmaceutical Journal.

NOTES AND STATISTICS OF CINCHONA BARK. By JOHN HAMILTON. London; J. W. Collings.

This little pamphlet of seventeen pages professes to give rough statistics of the importation of cinchona bark into some of the leading European countries and into the United States. The compilation of tables of statistics might appear, at first sight, to be an easy matter; but there are so many possible sources of error, and so many difficulties in the way of obtaining information, that the author may be congratulated upon being able to obtain even rough statistics on so complicated a subject as the commerce of cinchona bark. Mr. Hamilton has evidently taken much pains to collect reliable information, yet he has been unable to obtain any account from Spain and Austria; from the latter country because all importations of drugs are classed under one heading. There must naturally be much difficulty in making divergent accounts from different sources agree, and hence it can hardly be wondered at, that the statements on page 6, of the amount of Cinchona Bark exported in 1881, from England to France and the United States does not agree with that of the quantity imported from England in the same year by those countries, on pages 10 and 11.* This is more especially the case when one is at the mercy of printers. Thus in a foot-note on page 6, Mr. Hamilton remarks that he received the following reply anent the table A, when making inquiries as to the difference between statements obtained from the Board of Trade and others published in the *Ceylon Observer* :—

"The Board of Trade monthly accounts only give approximate quantities and value; the great difference in the values of 1878 arises from a printer's error in the monthly accounts."

Nevertheless tabular statements are always of considerable value, if even only approximately correct, and must of necessity afford abundant food for reflection. Thus the conclusion is arrived at that England is the chief market of the world for Cinchona Bark, and the value of its importations is shown to have increased from £218,565 in 1870 to £1,816,501 in 1881. Although more than half of the imports are again sent out of the country the value of the exports is less than that of the portion retained, indicating that the best Cinchona Barks remain in Great Britain. It is also an instructive fact that the value of the imports of East Indian Barks has increased from £22,682 in 1876 to £248,894 in 1881.

Comparatively little is said concerning the West Indian Barks, these having only entered into commerce within the last few years. There could, however, be no difficulty in obtaining information from Jamaica under the present active administration of the Botanical Department. So far as can be gathered from the tables, it would appear that most of these Barks find a market in the United States.

Another singular fact revealed by these statistics is the speculation which takes place in the Cinchona market. The variation in the price of quinine, of which 6s. 6d. in 1875 and 13s. in 1878 may be taken as examples, has led to frequent interchanges of Bark where least expected. Thus England has imported Cinchona Bark from France and Germany, although it has sent back in the same year more than it received. America also has imported Cinchona Bark from twenty-eight different countries, instead of only from those which produce it.

It is interesting to note also that while the Java bark received in Amsterdam in 1881 amounted to only 268,540 lbs., in the same year 1,864,912 lbs. of East Indian Bark was imported into the United Kingdom. The care taken in the cultivation indirectly comes out in the fact that the Java *Ledgeriana* Bark has steadily increased in percentage of quinine from the maximum percentage of 5·48 in 1872 to 9·00 in 1881. There are many other important facts and much useful information afforded by this little *brochure*, which should be in the hands of every one connected with the Cinchona trade.

It may be hoped that in a second edition the author will be able to add some respective values of the different varieties of Cinchona Barks, such as would give to planters some idea as to the species which would pay best in cultivation, and as to the country which would afford the best market for special varieties.

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* In refutation of this allegation of inaccuracy, I would beg to draw the attention of the author of this careful Review, firstly, to the fact that the commercial year of the United States ends on 30th June; and secondly, that although 1,084,272 lbs. of Bark were exported to France for its special consumption presumably, only 827,085 were used for that purpose. It is quite possible the difference after allowing for wastage, may have had its destination changed for some other country, or have been reserved for speculation.

From the Ceylon Observer,—November 20th, 1882.

EDITORIALS

STATISTICS OF CINCHONA BARK.

There is no more certain fact than that millions annually of the human race, and we might add of domestic animals, also, perish for want of ample supplies of the medicine, composed of the alkaloids of cinchona bark, which is almost a specific in case of malarious fevers. One of the most hopeful signs of our times, therefore, is the enormous increase which has recently taken place in the production of bark and its manufacture into quinine or the allied alkaloids. Much of the increase is, no doubt, due to the export from South America mainly of cuprean bark, the bark of a tree botanically distinct from cinchona, but possessing the same tonic and febrifuge properties. That the average prices of cinchona bark should have remained so steady in the face of the market flooded by this inferior substitute shews how largely the consumption of the alkaloids must be increasing. This fact is strikingly exhibited in a pamphlet issued by Mr. John Hamilton, lately of Dikoya, Ceylon, whose valuable contributions to our columns cinchona planters have appreciated. A mistake in some statistics furnished to us by Mr. Hamilton some time ago it is now explained, was due to a printer's error in the monthly accounts of the Board of Trade, which, it seems, give in any case only approximations, the correct figures being found in the annual accounts. The figures now furnished to Mr. Hamilton show a perfectly astounding increase in the imports of bark to Britain, with considerable advances in many other countries. In looking at values, Mr. Hamilton reminds us that we must take into account an average greatly lowered by the inpouring of cuprean bark. He might have added the effect of the large quantities of twig bark sent, especially from Ceylon. The increase in imports into Great Britain was from 2,535,000, valued at £218,000, in 1870, to no less than 14,040,000 lbs. valued at £1,814.000 in 1881; an increase of 11,504,000 lbs, and £1,595,000 in 12 years! While the imports from the United States of Colombia had increased eight-fold, the adverse influence of war in the case of Chili is shewn in a decrease equal to twelve-fold. The increase of imports into Britain was gradual until 1880, when a leap was made from 9 millions of lbs. in that year to 14 in 1881. Ceylon told for some of this increase in 1881, but the influence of our island will be much more apparent in the figures for 1882. The importations from British India are given from 1876, and they evidently include bark from Ceylon, as our London correspondent points out. We are rather surprized that Mr. Hamilton did not discriminate the bark from Ceylon. With the proviso that not quite all the bark exported from Ceylon goes to Britain, we now give the figures for total imports from the British East Indies with those for exports from Ceylon:—

Imports from B. I.	*Exports from Ceylon.*
1876... 154,480 lbs.	56,589 lbs.
1877... 511,168 "	173,497 "
1878... 514,864 "	373,511 "
1879...1,004,080 "	1,208,518 "
1880...1,814,736 "	1,207,720 "
1881...1,864,912 "	3,099,895

There are discrepancies here which we cannot reconcile, especially in the case of 1881, when only an aggregate of 1.864,912 was imported into Britain from the East Indies, against over 3 millions of lbs. exported from Ceylon alone. Can the balance have gone to the continent of Europe? The difference between calendar years and seasons could not produce the discrepancy? Britain seems to have imported from France and other western countries as well as exported to them, but as a general rule, keeping the best barks to manufacture into quinine. Of the 14 millions of lbs. imported into Britain in 1881, more than half (nearly 8 millions, in truth), came from the United States of Colombia, but a large proportion of this was Cuprea bark. The East Indies rank second as a source of supply; with Peru third; France fourth (but Britain exported thither about as much as she imported); and Ecuador sixth. The average prices in Britain have ranged from 1s. 1½d. in 1870, the lowest, to 2s. 11¼d., the highest in 1879. With the enormous imports of 9 and 14 millions in the two succeeding years the figures went down only to 2s. 7¾d. and 2s. 7d., while the mean average for the twelve years was 2s. 2¼d. These figures are surely encouraging, even when we find that out of the 14 millions of lbs. imported in 1881, one-half was exported. The actual consumption of bark in Britain has risen from 1,104,000 lbs. in 1870, to seven millions last year. The United States of North America seem to receive the vast bulk of ther supplies of bark from the United States of Colombia—cuprea mainly—although no fewer than 28 sources of supply are enumerated. As our readers are aware, the duty on quinine imported into America was recently abolished, much to the anger of the manufacturers, who thought *their* industry as much entitled to protection as others. There can be little doubt that, from the date of the abolition of the duty, the larger quantities of quinine imported would react on the figures for bark, and so we find that the quantity of the latter, which rose from 1,976,000 lbs. in 1877 to 6,388,000 in 1879, went down to 4,201,000 in 1881. The prices in the five years ranged from 1s. 1¼d. to 1s. 9d. the mean average being 1s. 3⅜d. It is significant that imports from Colombia went down from 5,248,000 lbs. in 1870 to 1,738,000 in 1881; the imports from England rising from 617,000 lbs. in 1879 to 1,242,000 in 1881. In this case we should like to see the quantity of quinine imported from England and France. The imports of Bark into the latter country rose from 2,079,000 lbs. in 1877 to 7,950,000 lbs. in 1881, England contributing 3,046,000. But the chief seurce of increase was in the rise of Colombian Bark from 1,430,000 in 1880 to 3,392,000 lbs. 1881, most of the increase being doubtless in cuprea. Of the 7,950,000 lbs. imported, only 3,017,000 lbs. were consumed, so that France, for decoctions and alkaloids, uses Bark only equal to 3-7ths the quantity employed in Britain. Of the imports of bark into France the larger portion is *en route* to countries in the interior of Europe. The consumption in France rose in 1881 so as to be higher by 2½ millions of lbs. than in 1877, and the average value was enhanced from 2s. 4½d. per lb. to 2s. 10¾d. the mean average for the 5 years being 2s. 8¼d. In Germany the bark imported and used had risen from 1,430,000 in 1877 to 4,769,000 in 1881, the value rising from 2s. in 1877 to 4s. 1d. in 1880, and 3s. 2d. in 1881, the mean average for the 5 years being 2s. 8½d., exactly as in France. The importations of Bark into Italy rose from 990,000 lbs. in 1876 to 1,807,000 in 1880, and then at a bound, to 5,546,000 in 1881. There is an important factory in Milan, and about 4,000,000 lbs. of Bark was converted into quinine in 1881, besides the quantity used in the rough state by the inhabitants of marshy and feverish places. American Bark is said not to be imported direct into the Netherlands, but such Bark must enter largely into the imports from England, which rose from 1,113,000 lb. In 1877 to 2,910,000 in 1881. The bulk received at Amsterdam from Java rose from 4,027 lbs. in 1879 to 170,000 in 1880, the estimate for 1881 being 220,000. This was Government Bark. From private plantations the imports are now larger than we expected—having risen as follow :—

1879	... ...	50,000 lbs.
1880	... ...	160,000 „
1881	... ...	90,000 „

The average value of Government Bark ranged from 1s. 11½d. in 1870 to 3s. 4d. in 1877 ; 3s. 3¾. in 1880 and down again to 2s. in 1881, the mean average being 2s. 4d. per lb. This is lower than we expected and knowing that some of the best Ledgeriana bark sold for over £1 sterling per lb., we are surprized at the low averages for Ledgeriana alone, even although much of it may have been twig bark. The average for 8,807 lbs. in 1878, yielding from 5 per cent. min. to 8 per cent. max. quinine, was only 4s. 9d.; while the highest price 6s. 8d. was realized by 4,317 in 1876, yielding only 3·09, to 7·02. In 1881 the quantity was 4,180 lbs., yielding such high results as 5 to 9 per cent. of quinine, but the value realized is not stated. These are some of the interesting facts in Mr. Hamilton's book, and as he tells us he is to send 200 copies to Ceylon for sale, cinchona planters and all interested in the enterprize will have the opportunity of seeing the full details.